

**BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, DC 20554**

In the Matter of)	
)	
Modification Applications of Ligado)	IB Docket Nos. 11-109, 12-340
Networks Subsidiary, LLC)	
)	IBFS File Nos. SES-MOD-20151231-
)	00981, SAT-MOD-20151231-00090,
)	SAT-MOD-20151231-00091, SES-AMD-
)	20180531-00856

**COMMENTS OF AVIATION SPECTRUM RESOURCES, INC. ON THE AMENDMENT
TO THE APPLICATIONS OF LIGADO NETWORKS SUBSIDIARY LLC**

Aviation Spectrum Resources, Inc. (“ASRI”), by its attorney, hereby comments on the May 31, 2018, Ligado Networks Subsidiary LLC (“Ligado”) amendment (“Amendment”) to its earlier applications to modify its license in the above-referenced File Numbers (“Modification Applications”).¹

I. SUMMARY

As stated herein, members of the aviation community continue to have grave concerns about the operational implications of the Modification Applications. The Amendment does not cure those concerns. While the Amendment now claims to adopt a power level consistent with the recommendations of the Federal Aviation Administration (“FAA”) as part of the United States Department of Transportation’s Adjacent Band Compatibility Report (the “ABC Report”), Ligado’s application of that reduced power level still presents significant operational problems for the aviation community.² In particular, Ligado continues to assume without justification that,

¹ Ligado Networks Subsidiary LLC, Amendment to License Modification Applications, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, IB Docket No. 11-109 (May 31, 2018) (“Amendment”).

² U.S. Department of Transportation, “Global Positioning System (GPS) Adjacent Band Compatibility Assessment,” Final Report (April 2018), available at

if Ligado meets that power level at a 250-foot radius of GPS interference around each Ligado base station, this “ensures that Ligado’s proposed ATC operations will fully protect certified aviation GPS receivers.”³ Unfortunately, this operating condition would still endanger certain aviation operations, especially for helicopters, and present severe threats to life and property.

Further, the Amendment’s proposed notification procedures, which Ligado has raised in *ex parte* submissions before, are inadequate. By notifying only the FAA and FCC, and doing so confidentially, Ligado would create unnecessary and safety-threatening obstacles to aviation operators to obtain this important information.

In short, while Ligado is clearly attempting to advance its proposals through the FCC, its Modification Application does not address the outstanding operational GPS interference concerns expressed by aviation. Consequently, the FCC should defer action on the Modification Applications until these issues are appropriately resolved.⁴

<https://www.transportation.gov/sites/dot.gov/files/docs/subdoc/186/dot-gps-adjacent-band-final-reportapril2018.pdf> (“ABC Report”).

³ Letter of Gerard J. Waldron, Covington & Burling LLP, Counsel to Ligado Networks LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, IB Docket No. 11-109, at 2 (May 31, 2018) (“Amendment Cover Letter”).

⁴ The Amendment does not address the concerns ASRI and others have repeatedly raised in the above-referenced dockets and files regarding the adverse impact of Ligado’s proposals on satellite communications and the direct downlink of meteorological data from the GOES-R weather satellites. These concerns, too, which ASRI has addressed elsewhere, must be resolved satisfactorily before the FCC considers the Modification Applications. *See* Letter of Dr. Joel N. Myers, Founder, President and Chairman, AccuWeather, *et al.*, to Chairman Ajit Pai, Federal Communications Commission, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, IB Docket Nos. 11-109, 12-340 (June 27, 2017); Letter of Edward A. Yorkgitis, Jr., Counsel for Aviation Spectrum Resources, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, IB Docket Nos. 11-109, 12-340 (June 20, 2017).

II. THE AMENDMENT FAILS TO RESOLVE KEY ISSUES OF INTERFERENCE AROUND LIGADO BASE STATIONS

Ligado claims that the amended Modification Applications are “consistent” with the ABC Report and therefore fully protect certified GPS receivers.⁵ This is incorrect. The Amendment would require that Ligado’s ancillary terrestrial component (“ATC”) base stations operating in the 1526-1536 MHz Band not exceed an EIRP of 9.8 dBW (≈ 10 W) with a +/- 45 degree cross-polarized base station antenna, a reduction from the nominal 32 dBW EIRP maximum set forth in the Modification Applications prior to the amendment.⁶ As previously proposed by Ligado in the above-referenced files and proceedings, Ligado requests that ATC base station antennas in in the 1526-1536 MHz Band not exceed the applicable maximum power outside a 500-foot diameter cylinder, specifically at any location less than 250 feet laterally or less than 30 feet below an obstacle clearance surface established by the FAA under 14 C.F.R. Part 77 and its implementing orders and decisions.⁷ Within these distances around its base stations, Ligado allows that harmful interference to certified aviation GPS receivers may occur. Finally, Ligado proposes reporting, notification, and monitoring obligations related to new and modified Ligado base station deployments.⁸

Ligado first proposed such a 500-foot diameter cylinder of certified aviation GPS interference as an operational concept to the FCC and aviation community in 2016.⁹ When

⁵ Amendment Cover Letter at 1-2 (citing ABC Report).

⁶ See Amendment at 4. The ABC Report confirmed that an EIRP limit of 9.8 dBW (10 W) at 1531 MHz would protect certified GPS aviation receivers operating beyond 250 feet from a Ligado base station. ABC Report at 118-19, 149, 152-53.

⁷ See Amendment Cover Letter at 2; Amendment at 1.

⁸ See Amendment at Exhibit 1.

⁹ See Letter of Gerard J. Waldron, Covington & Burling LLP, Counsel to Ligado Networks LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, IBFS File Nos. SES-

formally assessed by the aviation operational community in 2016, many operators expressed concerns and opposed such an airspace restriction.¹⁰ Indeed, in a June 15, 2018, *ex parte* letter filed in the above-referenced matters, numerous aviation organizations reiterated their operational concerns about Ligado’s plans, focusing specifically on the 500-foot diameter cylinder proposal.¹¹ Helicopters in particular are often required by their missions to operate outside of Part 77 obstacle areas at low levels for medical evacuations, other emergencies, or private operations.

Many members of the aviation community explained their concerns with the Ligado 500-foot diameter cylinder in its recent *ex parte* letter:

From the perspective of operators that conduct a variety of missions in the low altitude environment, including unmanned operations, often in close proximity to flight obstructions, a loss of navigational accuracy/reliability would produce distractions for operators, unnecessarily increase crew workloads, and could have adverse impacts on the ability to safely navigate. Additionally, within areas of high density tower deployment, operators could potentially experience repeated loss of GPS.¹²

Ligado’s assertion that aviation operations within 250-feet of a base station are via Visual Flight Rules, and therefore GPS is not required, fully misses the uses of GPS during flight. For

MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091, IB Docket No. 11-109, at Attachment (Sept. 8, 2016).

¹⁰ See RTCA, Tactical Operations Committee (TOC) Meeting Summary, at Attachment 4 (Dec. 13, 2016), available at http://prod-ha.rtca.org.373elwb11.blackmesh.com/sites/default/files/toc_dec_2016_summary.pdf.

¹¹ See Letter of Capt. Tim Canoll, President, Air Line Pilots Association, International, *et al.*, to Daniel K. Elwell, Acting Administrator, FAA, IB Docket Nos. 11-109, 12-340, at 1 (June 15, 2018) (“Interference issues that have the potential to negatively impact the operational aviation environment remain unresolved, and require definitive testing and evaluation before any system deployment.”) (“June 15 Letter”). In contrast with this large group of aviation interests, to ASRI’s knowledge, ASRI is only aware of a single aviation operator, a helicopter company, that has supported Ligado’s plans in the Commission’s record or during RTCA discussions.

¹² *Id.* at 2.

example, the Helicopter Terrain and Avoidance Warning System requires GPS to manage obstacle clearance for hazards such as powerlines, which may well be within a base station's 250-foot radius standoff cylinder.¹³ Other onboard systems that may use this GPS signal would also be affected, such as the Automatic Dependent Surveillance-Broadcast position reporting that is quickly becoming a core capability in the U.S. national airspace for air traffic management and aircraft coordination.

Furthermore, the ABC Report has not endorsed Ligado's standoff cylinder proposal.¹⁴ While the ABC Report assumes a 250 ft. "assessment zone" in its analysis, it makes clear that the FAA "has not completed an exhaustive evaluation of the operational scenarios in developing this assessment zone."¹⁵ Among other things, the FAA plans to examine these issues for helicopters and unmanned aircraft systems, both of which can be expected to operate near the ground and, by extension, Ligado base stations. This statement plainly falls well short of an acceptance of Ligado's operational proposal regarding the 500-foot diameter standoff cylinder.

III. LIGADO'S PROPOSED PROCEDURES WOULD PROVIDE INSUFFICIENT NOTIFICATION TO AVIATION OPERATORS OF NEW AND MODIFIED LIGADO BASE STATIONS

Furthermore, the proposed Amendment to the Modification Applications and supporting narrative fail to address key questions for all direct and indirect aviation stakeholders, including the flying public and businesses that rely upon aviation.

First, in the Amendment, Ligado proposes a procedure whereby it will notify the FAA and the FCC 30 days in advance of installing or modifying a base station of the station's

¹³ See RTCA, Summary of Ligado Proposal Review by RTCA SC-159, at Appendix A (Dec. 13, 2016) ("RTCA SC-159").

¹⁴ See ABC Report at 5.1.1., p. 120.

¹⁵ *Id.*

location, radiation center height above ground level, antenna tilt, and other antenna specifications – to be submitted confidentially and accessed pursuant to the FCC’s rules.¹⁶ Operators would not be notified, and presumably would have to proactively and continuously search FAA and FCC public notices to see if Ligado has made such a filing, and then would have to request access through the FCC’s confidentiality procedures before receiving notice of new and modified stations that could impact the environment in which certified GPS receivers operate.

Without readily knowing accurate and timely details on where Ligado base stations operate, low-level aircraft operating outside of Part 77 obstacle areas would be subject to unexpected harmful interference to GPS. Having new and modified base station location and related data held in confidence at the FCC while requiring every single operator to sign a confidentiality statement at the FCC, and then manually check with the FCC for new notices every time a pilot wishes to fly is hardly a practical solution for any involved.¹⁷ Airspace notification and distribution is a critical function that cannot be assumed to happen via non-aviation confidential databases for very good reasons given safety implications for pilots.

Second, the Ligado proposal for location data does not consider the implications for interference reporting and enforcement activities. Because airborne GPS receivers cannot differentiate types or frequency of interference for the pilot, would operators now be correct to

¹⁶ See Amendment, Exhibit 1.

¹⁷ In the past, Ligado has used the FCC’s confidentiality procedures to preclude access to ASRI’s outside counsel and ASRI’s technical subject matter experts to confidential satellite communications interference study material clearly relevant to the aviation communities’ interests. See Letter of Gerard J. Waldron, Covington & Burling LLP, Counsel to Ligado Networks LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, SAT-MOD-20151231-00091; IB Docket No. 11-109, at 1 (January 27, 2017). While this matter was eventually resolved between the parties, ASRI is concerned should any aviation operators encounter similar Ligado objections to gaining access to base station information, which could endanger pilots and passengers as well as equipment and property.

assume all low-level interference to GPS is from Ligado in the absence of ready information on Ligado's base stations? Coupled with the lack of specifics on how Ligado will monitor and control its cellular base-stations, these are substantial unknowns with implications for industry and the FCC that should not be left for a decision later.

Finally, ASRI would note that Ligado committed to RTCA during its technical assessment in 2016 that a minimum Inter-Site Distance ("ISD") of 433 meters be implemented between cell towers operating 1526-1536 MHz.¹⁸ In its submission to RTCA that the FAA assessment was based upon, Ligado stated that it "will propose that its license be conditioned to limit deployment of sites only where the inter-site distance is 433 meters or greater."¹⁹ The Amendment does not request that such a condition be imposed on Ligado's license. Consequently, the FCC should require Ligado to clarify its intent for a minimum ISD.

ASRI has met with Ligado directly to address these questions several times in the past and has yet to receive a formal answer that lays out a plan compatible with current aviation operations for such critical airspace safety functions. The Amendment as presented does not resolve the aviation community's operational concerns and is largely a restatement of what has been proposed by Ligado in the past.

IV. CONCLUSION

The Amendment filed by Ligado has failed to fully address the operational concerns aviation has been raising for a long time that would affect flight safety and regularity of operations. While the aviation community has shown a willingness to work with Ligado,

¹⁸ Ligado, A method for calculating adjacent band RF interference power received by a certified aviation GPS receiver from proximate terrestrial base stations (Sept. 19, 2016) (attached to RTCA SC-159).

¹⁹ *Id.* at 4.

Ligado's current efforts ignore multiple comments from different organizations expressing the need for corrective action and information on Ligado's part. Therefore, for the reasons set forth above, the issues raised herein regarding the potential harmful interference to GPS receivers used by the aviation community should be resolved before the FCC considers whether or not to grant the amended modification applications.

Respectfully Submitted,

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July 9, 2018

DECLARATION

In accordance with 47 C.F.R. §§ 1.16, 25.154, I declare under penalty of perjury under the laws of the United States of America that the facts contained in the forgoing Comments of Aviation Spectrum Resources, Inc. on the Amendments to the Applications of Ligado Networks Subsidiary LLC are true and correct.

Executed on July 9, 2018.

A handwritten signature in black ink, appearing to read "Andrew Roy", written over a horizontal line.

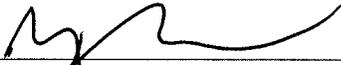
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CERTIFICATE OF SERVICE

I, J. Bradford Currier, in accordance with 47 C.F.R. § 25.154, hereby certify that on July 9, 2018, a copy of the forgoing Comments of Aviation Spectrum Resources, Inc. on the Amendment to the Applications of Ligado Networks Subsidiary LLC was served by overnight courier on the following:

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